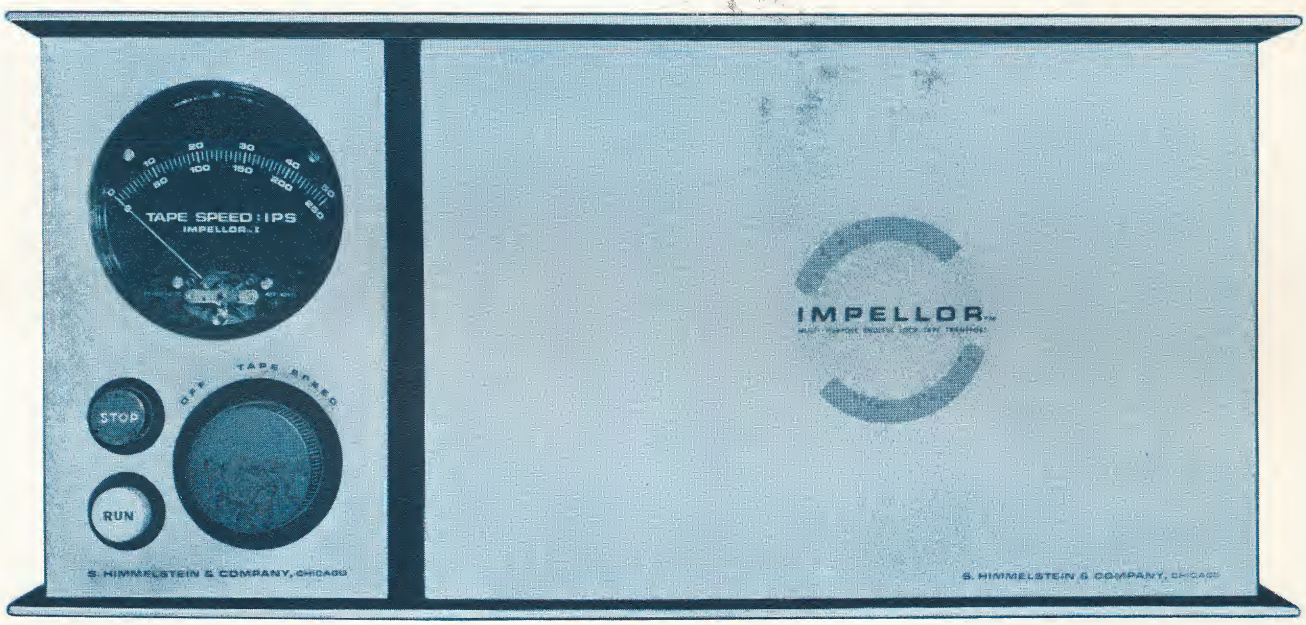
PRODUCT PROFILE—

IMPELLOR I™

MULTI-PURPOSE ENDLESS LOOP TAPE TRANSPORT

AN EXCEPTIONALLY versatile and reliable tape transport uniquely suited for tape testing, head testing and magnetic tape system development. Its unusual operating characteristics make feasible the economical development of multi-channel, wideband delay lines, recirculating memories, bandwidth compressor/expanders, transient spectrum analyzers, transient recorders and related memory/data-analysis devices.



SIMPLE, wide range controls and adjustments permit routine changing of all important tape/head/drive transport parameters. Important features and options which can be readily combined *without restrictions* include:

PNEUMATIC TAPE DRIVE—eliminates pinch rollers and associated mechanisms.

THREE TAPE WIDTHS—interchangeable tape path components for ¼″, ½″ and 1″ tapes.

INTERCHANGEABLE TAPE TYPES—handles paper, plastic and metal base tapes 0.00025″ to 0.010″ thick.

VARIABLE LOOP LENGTHS—any loop length from 40″ to 50′ accommodated by standard loop stores. Optional magazine has a 650 foot capacity.

VARIABLE TAPE SPEED—15/16 to 250 inches/second.

VARIABLE TAPE TENSION—continuously adjustable to 16 ounces per inch of tape width.

CONVENIENT HEAD MOUNTING—2 separate precision baseplates provide large head, guide and preamplifier mounting space.

TWO-AXIS HEAD POSITIONER—accurately calibrated (0.001″) table positions special head mounting plates along and/or across the tape path.

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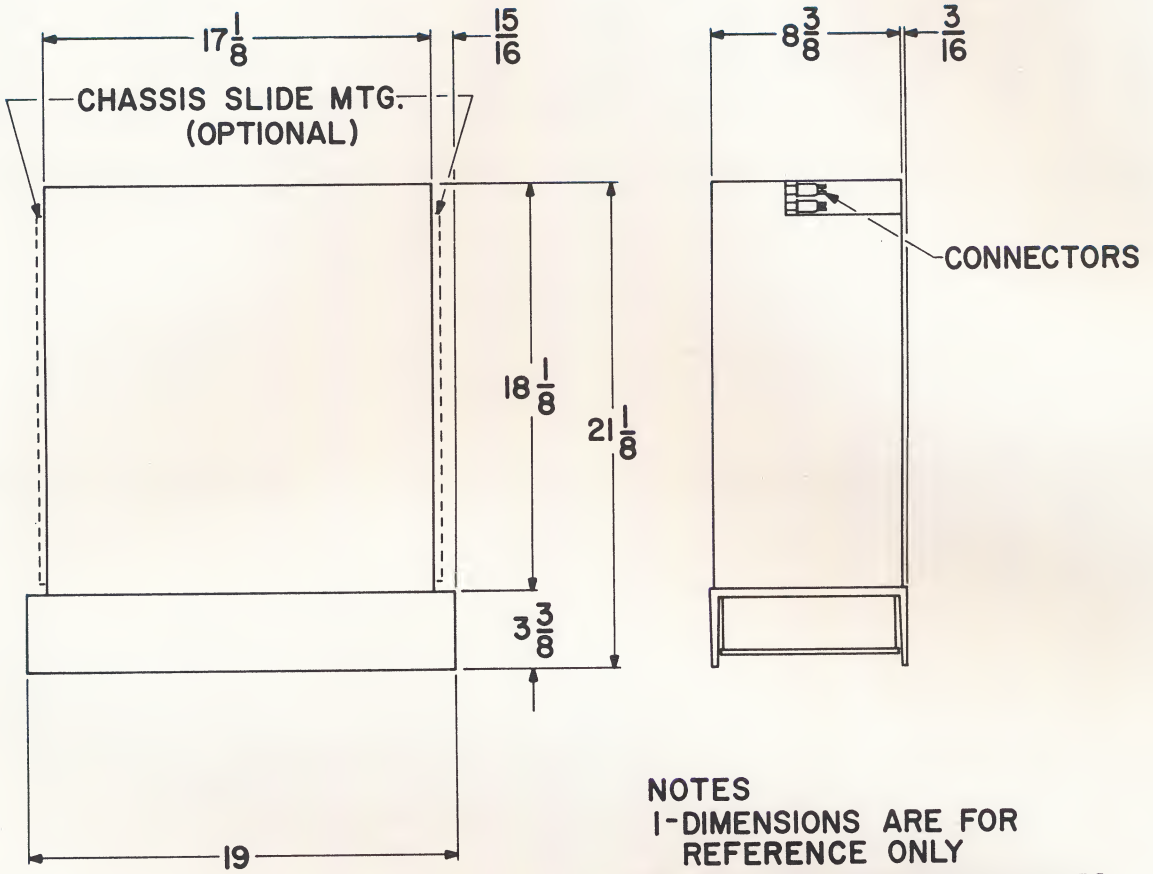
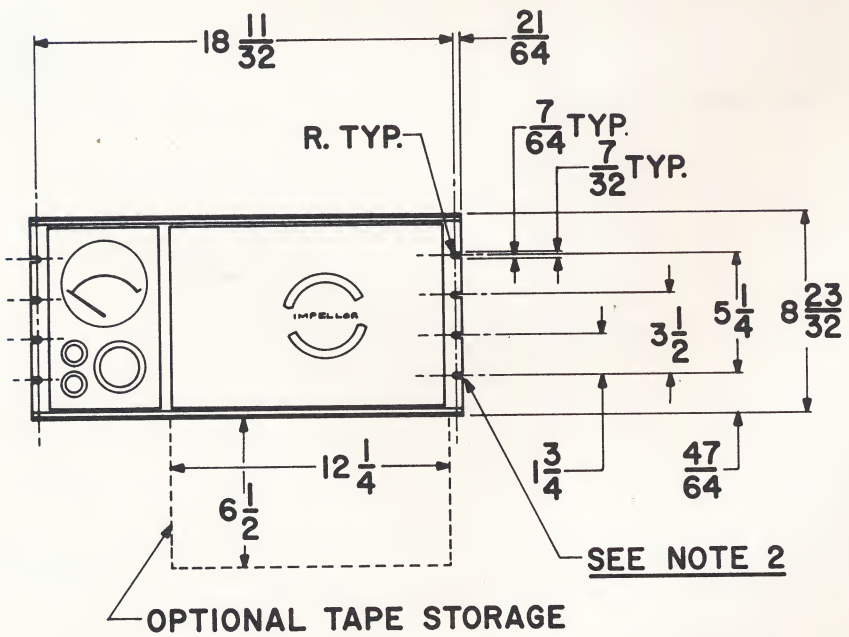


NOTES
1-DIMENSIONS ARE FOR REFERENCE ONLY
2-SLOTTED MOUNTING HOLES SUPPLIED ONLY IF SPECIFIED



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IMPELLOR I—General Description

IMPELLOR I is a reliable, instrumentation-grade tape loop drive mechanism which, in combination with standard and optional components, provides an extremely wide range of operating conditions. Using it, one may rapidly vary tape system parameters such as tape speed, tape tension, tape width, tape thickness, head configuration, etc. The operating characteristics and reliability of system components (heads, tape, circuitry, etc.) may be rapidly and economically measured with its aid. Furthermore, complete record/playback systems can be breadboarded and de-bugged without premature mechanical design of new transports or costly modifications of existing ones. After the desired transport characteristics have been conclusively established *by actual system tests,* a specialized transport can be developed, if required. In that connection, single purpose versions of IMPELLOR I are available on an O.E.M. basis permitting fast, low-cost conversion of an operating breadboard into a production system. Your inquiries are invited.

To facilitate head and guide installation, standard baseplates come equipped with mating connectors installed on the IMPELLOR Deck. Baseplates are securely held against precisely machined surfaces of the deck casting and, when installed, are accurately referenced to the tape path. Standard baseplates may be replaced by an interchangeable two-axis adjustable plate which can position mounted heads a total of 2¼″ along and 1″ across the tape. Positional readout accuracy is ±0.001″. Coaxial cabling can be installed to chassis connectors at the rear of the deck.

Important Features

IMPELLOR I incorporates advanced tape handling techniques to protect the tape, to insure positive, precise tape drive, and to provide maximum reliability during continuous hard usage. Design features which contribute to the achievement of these desirable characteristics are:

PNEUMATIC TAPE DRIVE—

THE TAPE is driven through its backing surface by a pneumatic capstan and only the tape backing makes contact with the drive system components. Because pinch rollers have been eliminated, it is not possible to damage the tape surface by repeated pinch roller engagement or contaminate it with foreign particles deposited by continuously contacting pinch rollers. With the pneumatic capstan, non-uniform stress distribution across the tape, caused by pinch roller misadjustment, is not possible. Thus, a major source of uneven head wear and of drive system caused tape skew has been eliminated.

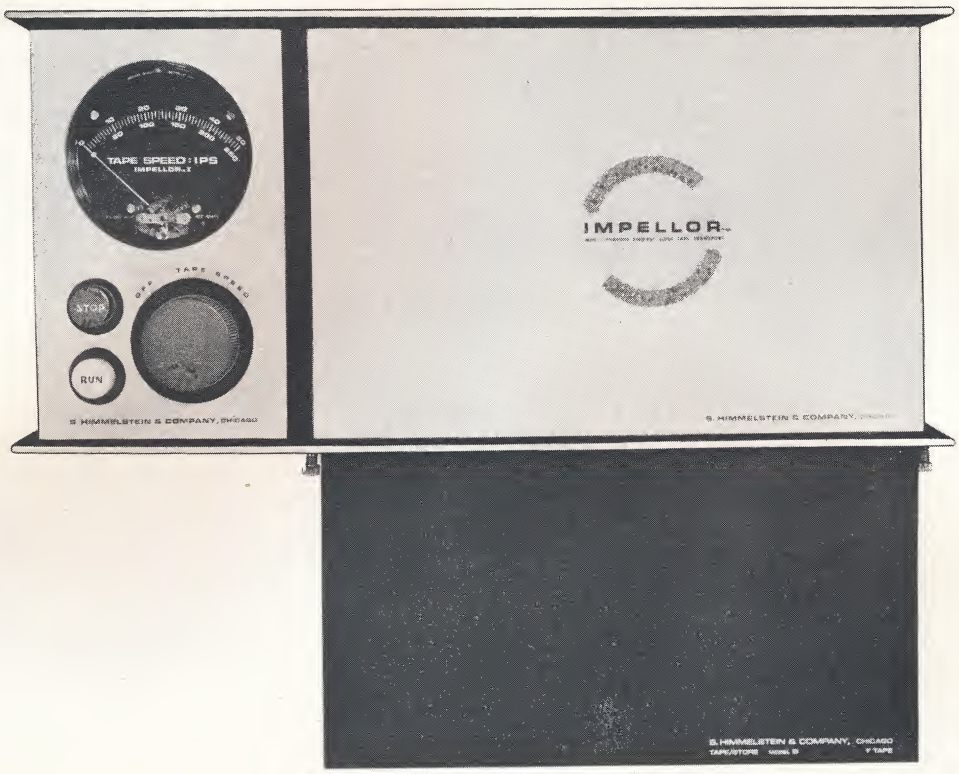
PNEUMATIC TAPE TENSIONING—

PNEUMATIC techniques are used to provide constant and uniformly distributed tape tension and to buffer the head area from tension transients. The possibilities of introducing variations, wear and/or misadjustments in mechanical tensioning devices have been eliminated. This system is also used to vacuum clean loose particles (whether oxide, binder or outside contaminant) *before* the tape enters the head area.

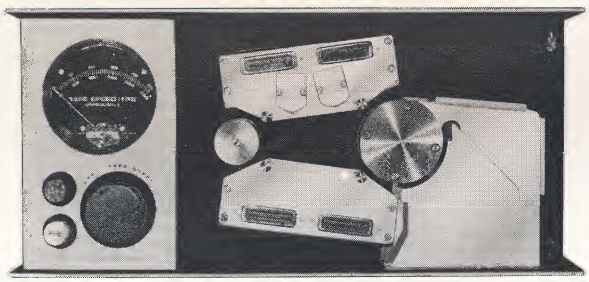
GENTLE, UNIFORM TAPE ACCELERATION—

EXCESSIVE tape tensions caused by fast, uncontrolled or improperly adjusted tape starting (or stopping) are not possible in the IMPELLOR tape deck. Tape acceleration is uniform and gentle. The tape is accelerated (or decelerated) with the capstan, i.e., both the capstan and tape are brought up-to-speed or stopped together. This procedure avoids the introduction of shock transients associated with high tape accelerations—conventionally accomplished by clamping tape to a rotating capstan. Furthermore, tape elongation cannot be introduced from mismatch or misadjustment of reel motor and actuator acceleration characteristics. Dynamic braking is used instead of mechanical brakes and produces uniform deceleration *intrinsically unaffected by wear and use.*

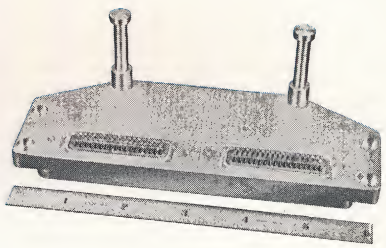
BEYOND ITS INHERENTLY superior design features, IMPELLOR I is constructed to the highest instrumentation standards for quality and workmanship. All components are conservatively rated. Bearings are permanently lubricated, shielded, precision ball types; the tape deck is built around a rigid, stabilized casting; all tape path components including baseplates are accurately referenced to machined surfaces of the deck casting; metal surfaces are treated for protection and life. *Under the most severe combination of specified operating conditions, no component will be overloaded, or fail prematurely.*



IMPELLOR Using Cartridge and/or Magazine Loop Store



IMPELLOR With Heads Mounted



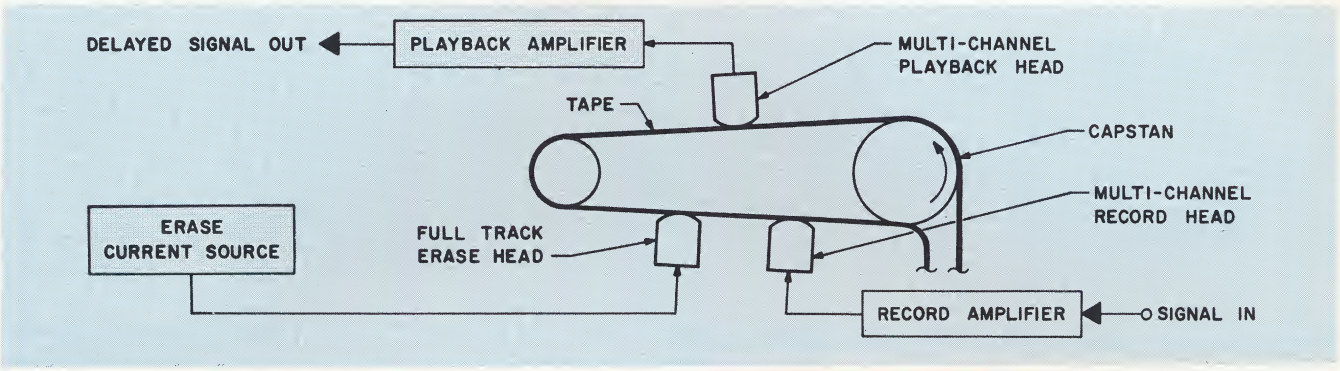
Head Baseplate With Tape Guides

IMPELLOR Using Gravity Loop Store

Examples of Unique IMPELLOR I System Applications

THE FOLLOWING PARAGRAPHS summarize some unusual systems that may be constructed, using IMPELLOR I and which are made possible by unique IMPELLOR operating characteristics. IMPELLOR may be used for recording in Direct (Analog), Frequency Modulation (FM), Pulse Duration Modulation (PDM) or Digital (including PCM) modes. Consequently, the maximum bandwidth of the systems described below will vary with the type of recording scheme used. To simplify this discussion, we will assume that Direct recording is being used with conventional (IRIG Document 106-60) bandwidths or with extended bandwidths. Conventional bandwidth systems have a minimum recorded wavelength of 0.0006″. Extended bandwidth systems, as used here, have a minimum recorded wavelength of 0.0002″. Greater bandwidth extension (minimum wavelength of 0.00008″ corresponding to 3.125 MC @ 250 ips) is possible with current state-of-the-art techniques.

Long, Wide Bandwidth Multi-Channel Time Delay



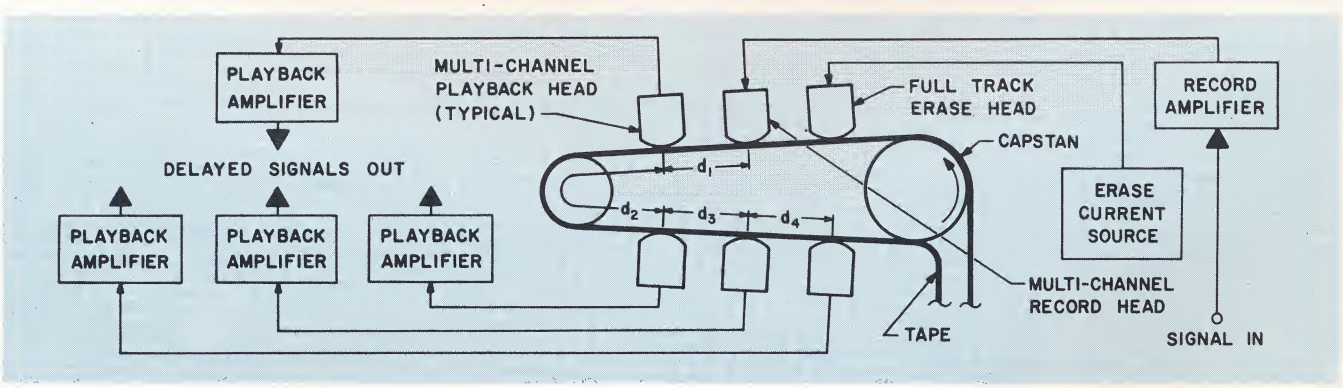
EACH channel is continuously delayed by a fixed time determined by loop length and tape speed. Table I summarizes IMPELLOR I long time delay capabilities and bandwidths obtainable using the record parameters described above.

TABLE I—LONG TIME DELAY RANGE AND BANDWIDTH

Loop Store	Tape Speed	Time Delay		Maximum System Bandwidth	
		Maximum	Minimum	Conventional System	Extended System
Standard	15/16 ips	640 sec.	64 sec.	1.56 kc	4.67 kc
Cartridge	250 ips	2.4 sec.	0.24 sec.	417 kc	1.25 mc
Optional	15/16 ips	8300 sec.	128 sec.	1.56 kc	4.67 kc
Magazine	250 ips	31 sec.	0.48 sec.	417 kc	1.25 mc

NOTES: 1) Time delay is directly proportional to loop length and inversely proportional to tape speed
2) Maximum bandwidth is directly proportional to tape speed.

Short, Wide Bandwidth Multi-Channel Time Delay



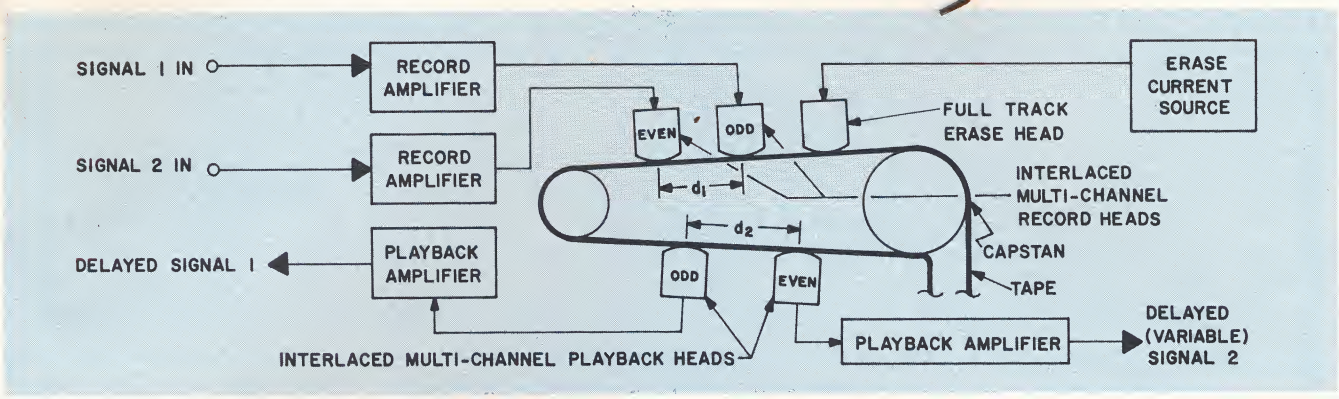
EACH-INPUT CHANNEL is continuously delayed by a fixed time determined by the distance (d_1) between the gap line of the record head and the reproduce head and the tape speed. Additional discrete delays are obtained for each playback headstack; each such delay is proportional to the distance between the record head gap line and the playback head gap line. *Assuming a distance of 0.8″ between the gap lines of the record head and first playback head* (conservative on the basis of head configurations available from independent suppliers), Table II gives the minimum time delays obtainable.

TABLE II—MINIMUM OBTAINABLE TIME DELAYS

Tape Speed	Minimum Time Delay
15/16 ips	0.85 seconds
250 ips	3.2 milliseconds

NOTES: 1) See Table I for maximum system bandwidths.
2) Time delay is inversely proportional to tape speed.

Ultra-Short, Wide Bandwidth, Channel-to-Channel Time Delay



THERE IS A CONTINUOUS time delay between each input channel and each output channel as explained for the examples on Page 6. In addition, there is a differential time delay between Input No. 1 and Input No. 2. Using a special head positioning table, the distance d_2 can be adjusted so that it varies from less to greater than the distance d_1. Hence, the time delay between these groups of channels (odd and even) can be made to vary from a negative (an effective speed up) through zero, to a positive (or real) delay. IMPELLOR I deck geometry is such that differential delays anywhere within the range from −3.2 milliseconds thru +3.2 milliseconds are obtainable at 250 ips with an adjustment resolution of 4 microseconds. At 15/16 ips, the differential delays possible vary from −0.85 seconds to +0.85 seconds and have an adjustment resolution of 1 millisecond. Refer to Table I for applicable system bandwidth.

VARIABLE TIME DELAY

THE DELAY time obtained with the three arrangements described can be conveniently varied. For all examples, changing the distance between the record and playback head varies the time delay. This method, which includes possibility of using more than one playback head and the use of the optional adjustable head positioning table, has no effect on system bandwidth. For the first example cited on Page 6, the length of the tape loop may be varied, again changing the time delay without affecting bandwidth. For all examples, the tape speed may be varied with accompanying proportional changes in maximum attainable bandwidth. See Table I for bandwidth range.

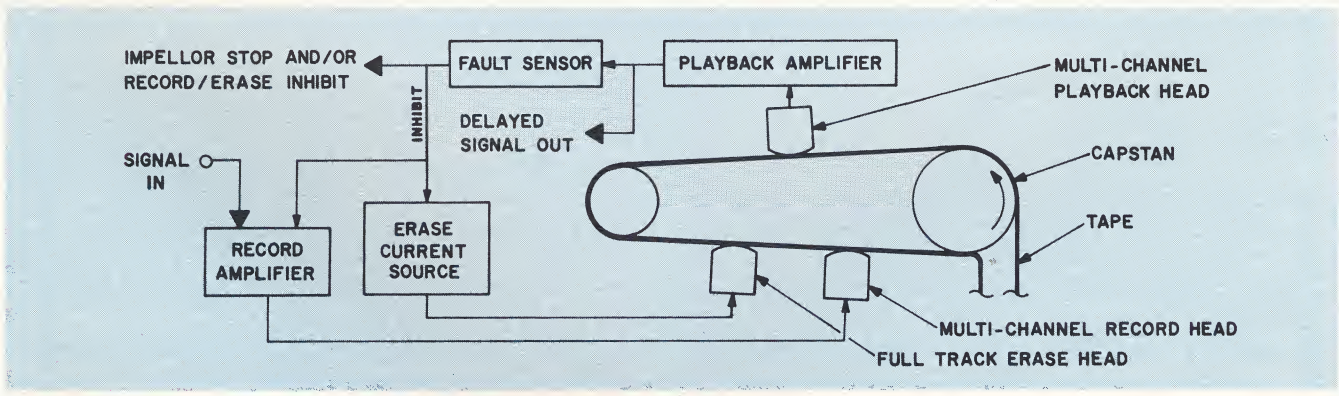
RECIRCULATING MEMORY

FOR the first three examples cited here, a recirculating memory can be achieved merely by turning off current to the record and erase headstacks after a recording cycle is completed. Then, recorded information may be continuously played back or recirculated as often as required. Furthermore, data may be erased and up-dated when necessary. The use of multiple playback heads yields a tapped delay line.

WIDE RANGE BANDWIDTH EXPANDER/COMPRESSOR

IF A RECORDING is made on IMPELLOR I in conventional manner, its bandwidth can be expanded or compressed merely by changing the playback tape speed. Recorded data may be repeatedly analyzed at one or more speeds with convenient, infinite resolution ratio adjustments and with a maximum ratio greater than 250 to 1. If desired, to further increase the flexibility of the IMPELLOR, with particular application to transient spectrum, correlation analysis and SNR enhancement, a rotating headwheel may be incorporated in the tape path. Standard S. Himmelstein and Company headwheels with scans up to 8″ long can be accommodated. Write for literature on our VI/SCAN Systems for an explanation of the advantages of this repetitive, fast scanning headwheel technique.

Multi-Channel Pre- and Post Fault Recorder



THE FAULT SENSOR illustrated is a circuit that recognizes the presence of a fault (or transient) of interest, during playback, and then generates a stop command for the IMPELLOR drive or, optionally, as shown, simultaneously generates an inhibit command for the record and erase circuits. This IMPELLOR I system will continuously cycle tape, record and erase data on each of its input channels. When a fault or transient occurs, *it will be recorded in its entirety including conditions before and after the fault, and then the recording cycle will be stopped.* The data thus recorded may be immediately subjected to detailed repetitive analysis, bandwidth compression (for recording high frequency data on paper charts), etc. again utilizing unique IMPELLOR characteristics. Alternately, IMPELLOR may be remotely interrogated for fault data.

IMPELLOR I Technical Specifications

Tape Speeds: Tape speed is continuously variable in two overlapping ranges; 3¾ ips to 50 ips and 15 ips to 250 ips. Speeds above and below these figures can be obtained in each range. However, performance specifications only apply when operated within the limits indicated. As an option the speed range can be extended to 15/16 ips.

Tape Speed Stability: Long-term tape speed variation is less than ± 1%, assuming constant line voltage and constant tape tension.

Wow and Flutter: At a tape speed of 120 ips, maximum cumulative peak-to-peak flutter measured over a bandwidth from 1 to 10,000 cps is 1% with a gravity loop store; 2% with a standard Cartridge loop store; and 0.75% with the Optional Magazine loop store.

Start Time: Less than 12 seconds at 250 ips and 6 seconds at 125 ips in Remote Mode. In Manual Mode, the ON/OFF Switch is coupled to the Speed Control so that Start Time is a function of manual setting.

Stop Time: Less than 6 seconds from 250 ips and 3 seconds from 125 ips.

Tape Tension: Continuously adjustable to 16 ounces per inch of tape width.

Tape Width: Standard interchangeable deck components provided for ¼″, ½″ and 1″ wide tapes. Other widths narrower than 1″ can be handled on special order.

Tape Type: Handles paper, plastic and metal base tapes.

Tape Thickness: Overall thickness between 0.00025″ and 0.010″.

Adjustable Head Positioners: As an extra cost option, two-axis adjustable head plates can be provided. They are interchangeable with standard fixed units and provide a total head travel of 2.25″ along the tape and 1.00″ across the tape. Positional information readout is accurate to 0.001″.

Fixed Head Baseplates: One each standard Upper and Lower baseplates are supplied. Each baseplate has 2 miniature 36 Pin Blue Ribbon Connectors installed; Type 57-10360. Additional baseplates are available at nominal cost.

Loop Capacity: 5′ to 50′ for standard Cartridge, 40″ to approximately twice the maximum available vertical free drop for a gravity Loop and 10′ to 650′ (1.5 mils thick) for the optional Magazine. IMPELLOR I comes equipped with one each standard Cartridge for ¼″, ½″ and 1″ wide tape each loaded with 48 ±2 feet of instrumentation grade tape.

Controls and Indicators: ON/OFF is combined with continuously variable Speed Control. Two illuminated pushbutton switches are used for tape START and STOP.

Tape Speed Monitor: 4½″ meter, 50/250 ips ± 1% full scale.

Remote Control: Tape motion can be remotely controlled via input to rear connector. Control requirements are: RUN—Floating Contact Closure, STOP—Open Run Contacts. Front panel mounted lights and tape speed monitor function in REMOTE Mode.

Input Power: 105 to 125 volts, 60 cps, single phase at 7.5 amperes, maximum.

Size: 8¾″ of vertical mounting space and 18⅛″ of depth in standard 19″ rack. Additional outboard vertical space required for loop storage.

Weight: 125 pounds.

Slide Mounts: Mounting slides are available as an extra cost option.

Head Cabling: At extra cost, baseplate receptacle connectors may be connected via coaxial cabling to 4 output connectors at the rear chassis; 36 pin Miniature Blue Ribbon, Type 57-40360.

Tape Guides: Non-magnetic stainless steel guides for ¼″, ½″ and 1″ wide tape are available at extra cost. When mounted on IMPELLOR baseplates, they correctly center the tape path and accurately reference the tape edge to the head mounting reference surface.

Head Mounting Service: If desired, customer supplied heads and guides can be factory mounted and wired on standard or adjustable baseplates. Send drawings showing envelope, mounting arrangement with tolerances, desired wrap angle and electrical connections for a quotation.

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NEW PRODUCT INFORMATION - FOR IMMEDIATE RELEASE

S. Himmelstein and Company announces the availability of a new family of instrumentation magnetic tape loop transports. Labeled IMPELLOR, these equipments possess unique capabilities as test beds for tape system design work ranging from studies and/or development of heads, tapes, read/write circuits to sophisticated memory systems. Unusual IMPELLOR operating characteristics make feasible for the first time, the economical development of multi-channel wideband delay lines, transient spectrum analyzers, bandwidth compressor/expanders, transient recorders and related memory/data analysis devices. Pneumatic tape drive, tape tensioning and tape buffering are used to provide maximum performance, reliability and tape protection.

IMPELLOR I, the first standard unit offered, has simple controls that permit routine adjustment of all important tape, head, and drive parameters. Tape speed is continuously variable to 250 inches/second, tape tension is adjustable to 16 ounces and the machine will handle 1/4", 1/2" or 1" wide paper, plastic or metal base tapes 1/4 mil to 10 mils thick. Two plug-in, precision baseplates provide large head, guide and preamplifier mounting space. Also available are accurately calibrated two-axis head positioner baseplates. Tape loop lengths may be varied from 40 inches to 650 feet.

For Further Information Contact Mr. A. J. Padorr; Telephone: 312-465-6022